

DU PONT  
**CRONAFLEX®**  
ENGINEERING REPRODUCTION FILMS  
APPLICATION BULLETIN

## Photodrawing: A Better Means of Engineering Communications

*By  
Theodore Warzel, Chief, Photographic Department  
Univac Division, Remington Rand Corporation  
Philadelphia, Pa.*

The Univac Division of Remington Rand is concerned primarily with research and development rather than the actual production of computing devices. Its task is to evolve the prototypes . . . and effectively transmit the design and assembly data to the company's production facilities and customers here and abroad.

Thus, where engineering drawings are concerned, their adaptability to progressive changes and refinements is



Author Warzel and Albert Bellino, draftsman, check out a finished master photodrawing on CRONAFLEX film. New system has cut drafting costs measurably, improved communication value of drawings.

of special importance. A final drawing that provides the most graphic means possible of transmitting novel design concepts and specifications is their goal. All of this at minimum cost, of course.

The solution to the problem at the Univac Division is the medium of photodrawings utilizing Du Pont CRONAFLEX Engineering Reproduction Films. Stated simply, photodrawing—or photodrafting—is the use of a photographic image as the main body of an engineering drawing with detail and call-outs filled in by a draftsman.

This technique has already saved Remington Rand a tremendous amount of drafting time and cost. It is estimated that a photodrawing can be made about 25 times faster than a conventional drawing. At the same time the data is transmitted more effectively than ever before—this is particularly important where language barriers are involved. Spatial relationships, form, contour—all of these are far more quickly grasped when presented photographically than when depicted by sections, views and symbols. In fact, in some instances *only* a photograph can do the job.

#### **BASIC TOOLS**

Two things are basic in this photodrafting system. One is a master file of engineering photographs—either 8x10 glossies or 4x5 negatives. These photos—comprehensive and detail views of models, mock-ups and completed prototypes—are the basis of almost all the drawings.

The other basic tool is a preprinted, positive drafting form, complete with ruled borders, marginal keys and standard title block. These formats are produced in advance on CRONAR Direct Positive Clear Film and stocked in standard sizes 11x17, 17x22, and 22x34 inches. When Engineering requests a photodrawing, it specifies subject matter and size of format wanted and furnishes a sketch showing desired location of photographic elements on the format.

## MAKING THE HALFTONE PRINT

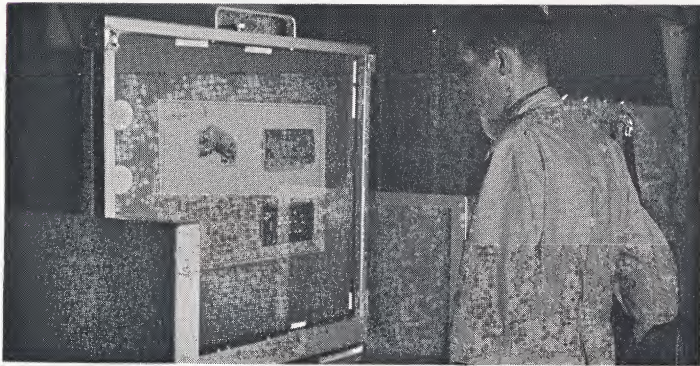
The typical photodrawing starts with the 8x10 glossy print—taken directly from file or produced from a file negative. This is the reflection copy for the process camera, and from it a halftone negative on CRONAR Ortho A Litho Film is made using a contact screen.

While photodrawing is possible without the use of a halftone screen, for best results a screen is a must. For one thing hand-ruled lines drawn on a halftone image are more legible than those drawn on continuous tone copy. But most important of all, the quality of the diazo reproductions made from a halftone intermediate is far superior to those obtained from a continuous tone intermediate.

## CALL-OUT WINDOWS

In many instances the photodrawings require call-out windows within the halftones. To produce them photographically, the designated areas as requested by Engineering are masked out with pressure-sensitive tape on the CRONAR Ortho A halftone negative. This negative is then contact printed to CRONAR Ortho A. The result is a positive with windows automatically dropped out.

This positive—or positives as the case may be—is then stripped onto the back of the preprinted, positive draft-



Positive halftones are stripped onto preprinted drafting format, and the composite printed on CRONAFLEX Direct Positive Film as shown here. High contrast of CRONAFLEX emulsion assures quality halftone reproduction.

ing format (CRONAR Direct Positive Clear). The resulting composite in turn is contact printed to CRONAFLEX Direct Positive Film, producing the basic working drawing. It is on this photodrawing that the draftsman adds call-outs, assembly detail, pertinent notes and legends—to arrive at the master original on CRONAFLEX.

CRONAFLEX is the ideal medium for the master original for several reasons, one of which is its durability. It does not "dog-ear" . . . it resists kinking better than any other drafting medium . . . and it is almost impossible to tear. It erases easily too . . . without damage. This permits the numerous revisions necessary in prototype development work. With all of this, CRONAFLEX also has an excellent drafting surface on both sides which accept ink or pencil as well as the finest cloth.



To complete the photodrawing, draftsman adds assembly detail, call-outs, etc. Speed with which drawings can be made permits a far more comprehensive set of assembly prints for each project.

### **FAST PRINT-BACK**

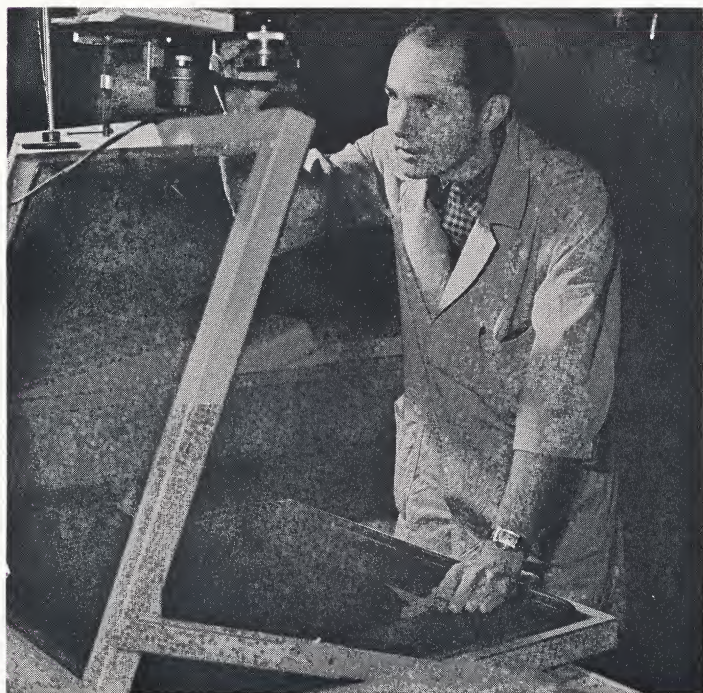
In making diazo prints photodrawings are handled in the same manner as conventional line drawings. And because of the durability of CRONAFLEX, they can be run through reproduction machines innumerable times without damage. Further, because of the greater translucence of CRONAFLEX, it is possible to produce larger quantities of reproductions in a shorter time than was

previously possible. The time saved is a big factor—particularly when large numbers of prints are needed. And there's no need to worry about kinks in CRONAFLEX. *They do not print through in the reproduction.*

Frequently, duplicate masters of the photodrawings are made also using CRONAFLEX Direct Positive Film. These second originals then go to company facilities throughout the world for use in their own reproduction machines.

### ALTERNATE HALFTONE TECHNIQUE

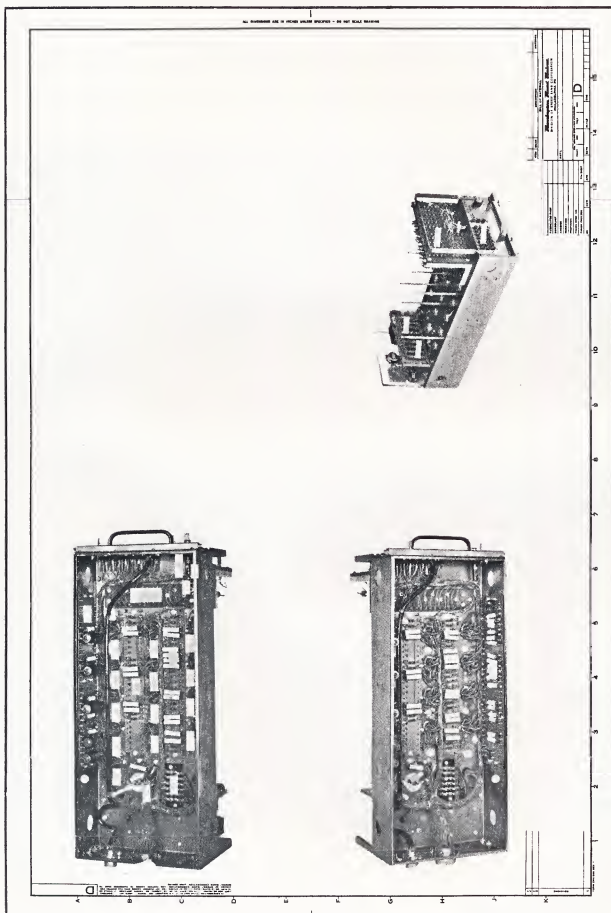
Where call-out windows are not required in halftone areas, it is possible to work directly from file negatives, using an enlarger and a vacuum-frame easel. The negative is projected through a contact screen onto CRONAR Ortho A to produce a positive halftone—in one step. As



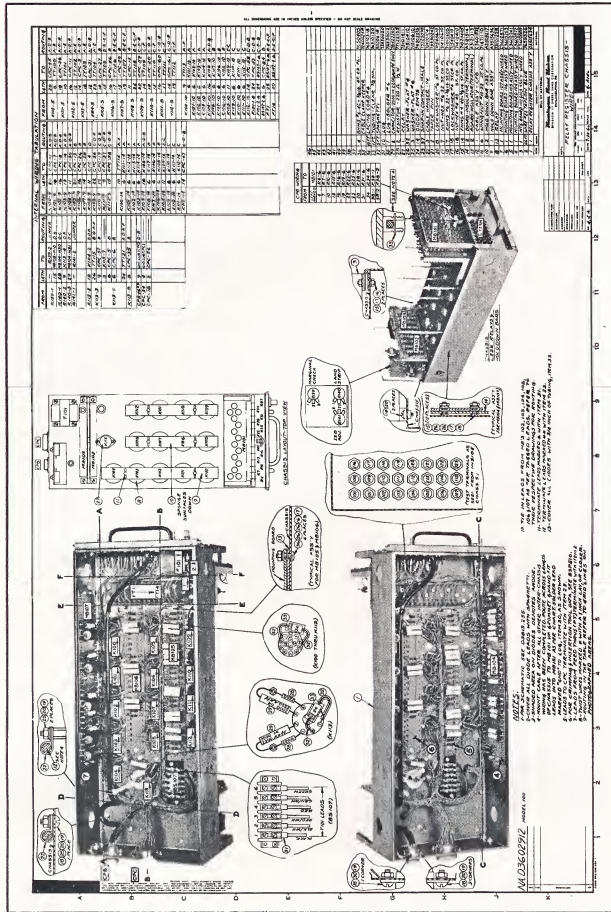
Where call-out windows are not needed in halftone areas, time is saved by using 4 x 5 negative in enlarger, projecting onto CRONAR Ortho A Film through a contact screen. Vacuum frame assures good contact between film and screen.

before, the halftone positive(s) is then stripped into the positive drafting format, and the composite contact printed to CRONAFLEX Direct Positive Film, producing a working photodrawing.

Whichever technique is used, the results have been gratifying. With photodrawings on CRONAFLEX, drafting costs have been reduced sharply. At the same time the assembly data is being transmitted more effectively, and the quality and life expectancy of the drawing are better than ever.



Basic photodrawing: prior to drafting.



Master original: basic photodrawing plus drafting.

**DU PONT CRONAFLEX®**  
**ENGINEERING REPRODUCTION**  
**AND DRAFTING FILMS ON**  
**CRONAR® POLYESTER**  
**PHOTOGRAPHIC FILM BASE**

• **CRONAFLEX Direct Positive Film—.004 and .007 in.**

*Provides positive same-size black-line reproductions from original pencil or ink drawings and can be handled in room light. Eliminates conventional negative-positive step.*

• **CRONAFLEX Projection Film—.004 and .007 in.**

*Offers high contrast, projection speed emulsion for use in process cameras and enlargers.*

• **CRONAFLEX Contact Film—.004 and .007 in.**

*Gives you positive intermediate for diazo reproductions or blue-printing where negative-positive steps are used.*

• **CRONAFLEX Drafting Film—.004 in.**

*This new film makes it possible to go from original drawings to final reproduction with the same line of CRONAFLEX films. Its superb matte surface is especially balanced to accept pencil over an extremely wide hardness range.*

• **CRONAFLEX UC Drafting Film—.004 and .007 in.**

*The premium drafting and tracing film designed for the optimum in drafting quality. Especially popular where ink is to be used.*

For technical assistance or for information on Du Pont CRONAFLEX Engineering Reproduction and Drafting Films, contact the nearest sales office listed below:

**Atlanta 18, Ga.**

*1737 Ellsworth Industrial Drive, N.W.*

**Chicago 46, Ill.**

*4560 Touhy Ave., Edgebrook Station*

**Cleveland 16, Ohio**

*20575 Center Ridge Road, Room 116*

**Clifton, N. J. (New York)**

*380 Allwood Road, Allwood Station*

**Dallas 7, Texas**

*1628 Oak Lawn Ave.*

**Hollywood 38, Calif.**

*7051 Santa Monica Blvd.*

**Waltham 54, Mass. (Boston)**

*45 Fourth Ave.*

**Wynnewood, Pa. (Philadelphia)**

*308 E. Lancaster Ave.*

**Export:**

*Nemours Bldg., Wilmington 98, Delaware*

**In Canada:**

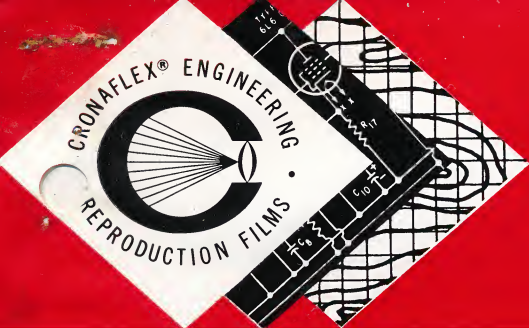
*Du Pont of Canada Limited, Toronto*

**E. I. DU PONT DE NEMOURS & CO. (INC.)**

**PHOTO PRODUCTS DEPARTMENT**  
**WILMINGTON 98, DELAWARE**

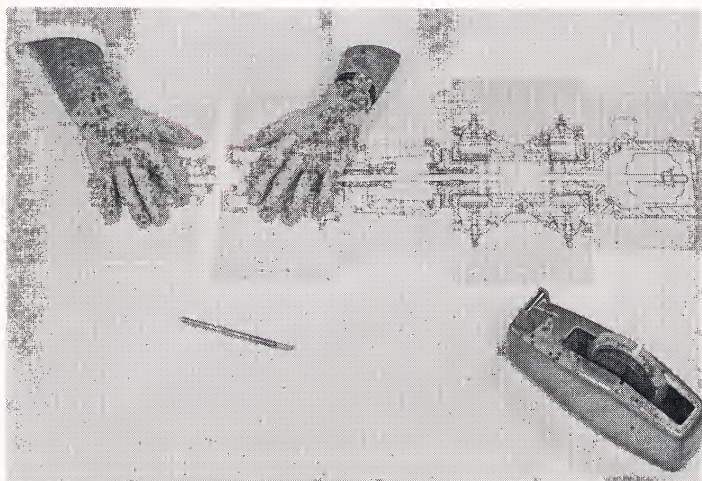


Better Things for Better Living . . . through Chemistry



# DU PONT **Cronaflex**<sup>®</sup>

APPLICATION BULLETIN



Skilled hands in Reproduction Department carefully tape together reproductions of various component parts according to Engineering's request.

## "Scissors Drafting" With CRONAFLEX\* Cuts Redrafting Cost By 85%

*By*  
Charles O. Miller, Supervisor, Reproduction Section  
Ingersoll-Rand Company, Phillipsburg, New Jersey

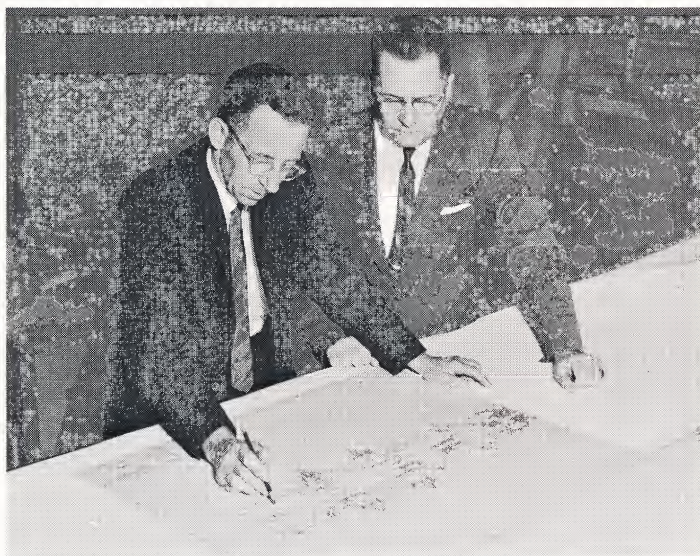
Perhaps your company produces a variety of pieces of equipment, many of which contain identical or similar components. If so, you may be spending valuable drafting-room time unnecessarily in copying portions of old drawings. Ingersoll-Rand Company also had this problem, but thanks to the substitution of a knife and CRONAFLEX Direct Positive Film, the cost of copying duplicate por-

\*Du Pont's registered trademark for its engineering reproduction and drafting films.

tions of a single drawing has been cut as much as \$250. At Ingersoll-Rand a wide variety of pumps, condensers, centrifugal and reciprocating compressors, refrigeration units and rock drill equipment is made. Most of this equipment is tailor made for specific customer needs. However, there are many basic parts which are interchangeable and are used on many pieces of equipment. Formerly a draftsman had to make an entirely new drawing for each new piece. If some interchangeable parts were to be used, they had to be copied from a previous drawing. Obviously, copying by hand was time consuming and expensive.

#### **ENGINEERING—MARKS WHITE PRINT**

This extra work has been largely eliminated with CRONAFLEX Direct Positive Film. Here's how. An engineer will send a diazo print (or prints) of a drawing to the Reproduction Section and indicate those sections of the drawing which he wants to retain. He may also indicate that other basic parts should be included. These are easily picked up from file by a coding system.



Author Miller, left, and engineer James H. Paul check marked diazo print with reproduction made by "scissors drafting" technique. Increased reliance has been placed upon Reproduction Section as a result of their cost-saving contributions.

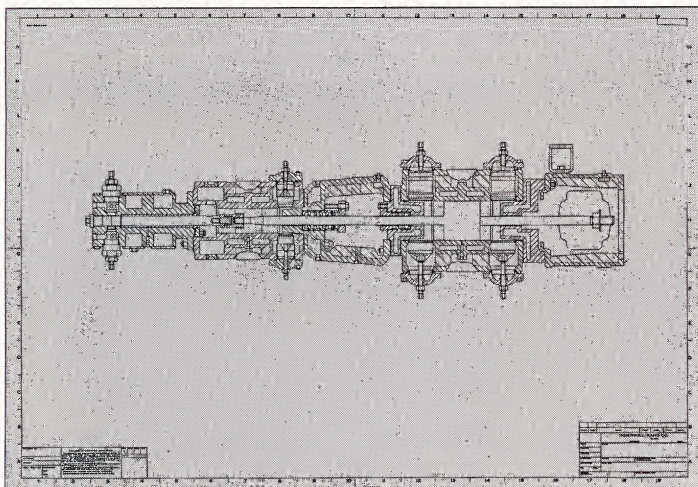
## REPRODUCTION—CUTS AND REPRODUCES

The Reproduction Section will get the original tracing or tracings which contain the interchangeable parts to be included in the new drawing. One-step reproductions are made on CRONAFLEX. Because of this direct positive printing method, time and cost are saved in the Reproduction Section because no negative is used.

From the reproduction(s) the desired portions are carefully cut out and taped together in accordance with Engineering's notes on the diazo print. The taped drawing is fastened to a preprinted positive format containing title block and border, and this combination printed to CRONAFLEX.

## BACK TO ENGINEERING

This master is then turned over to Engineering for the addition of new design. Drafting is done easily because of the excellent drafting surface on CRONAFLEX for both pencil and ink. After Engineering has added the necessary design information, the master is used to make diazo prints. The durability and high translucency of CRONAFLEX also make it an outstanding material for this purpose.

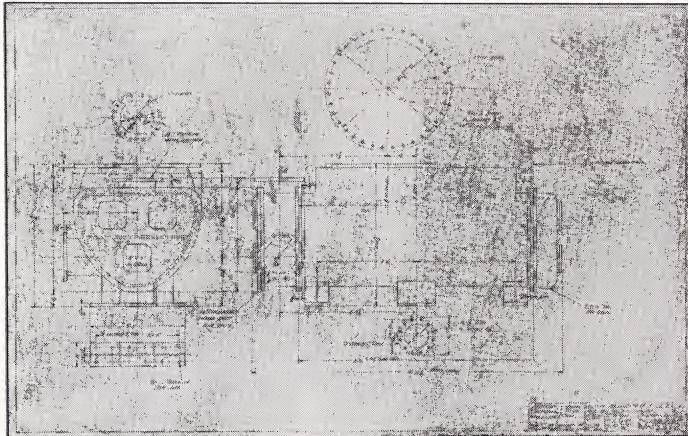


Master drawing produced photographically on CRONAFLEX has combined component parts from several drawings to create substantial drafting cost savings.

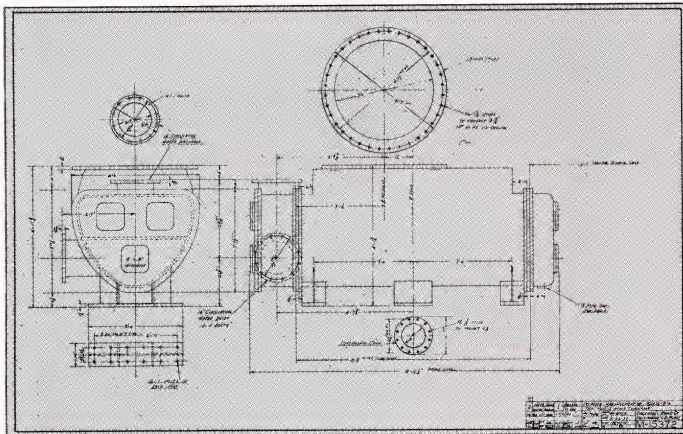
## BONUS: DIRECT POSITIVE RESTORATION

Another use for CRONAFLEX is in the restoration of very old drawings. Very often it is necessary to make a part for a piece of equipment manufactured years before. This means referring to drawings that have become soiled or yellow with age and from which accurate working prints are almost impossible to make. In such instances one-step direct positive masters on CRONAFLEX provide excellent working drawings.

Restoration of tattered drawings is also important cost-saving application of direct positive printing with CRONAFLEX. Note legibility of diazo print made from CRONAFLEX compared to one made from original tracing.



Original drawing

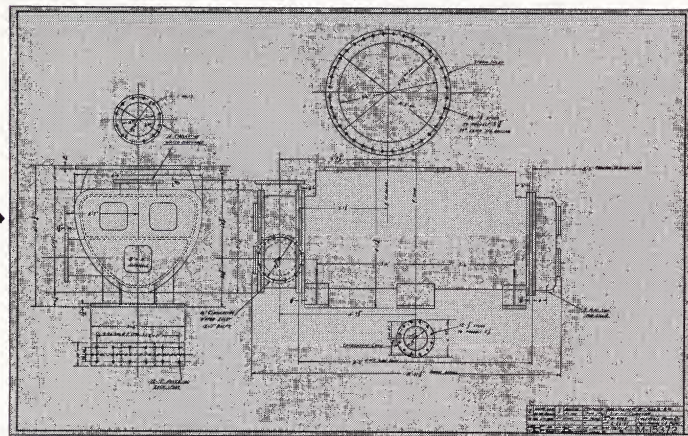


Restored drawing on CRONAFLEX

Original drawings made on either paper or cloth may date back 50 years. Before CRONAFLEX, draftsmen had to clean these fragile antiques as best they could with erasers or redraw the original entirely. Even erasing ran as high as \$15 or \$20 per drawing, and redrawing, as high as \$250. The direct positive reproduction of a 28 x 40 drawing costs around \$6.75, another significant saving with the bonus of now having a reproduction for file of true archival quality.



Diazo print from original



Diazo print from CRONAFLEX

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**ENGINEERING REPRODUCTION**  
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**CRONAR® POLYESTER**  
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• **CRONAFLEX Projection Film—.004 and .007 in.**

*Offers high-contrast, projection speed emulsion for use in process cameras and enlargers.*

• **CRONAFLEX Contact Film—.004 and .007 in.**

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• **CRONAFLEX Drafting Film—.004 in.**

*This new film makes it possible to go from original drawings to final reproduction with the same line of CRONAFLEX films. Its superb matte surface is especially balanced to accept pencil over an extremely wide hardness range.*

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*1628 Oak Lawn Avenue*

**Hollywood 38, Calif.**

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**Waltham 54, Mass.**

*45 4th Ave. (Boston)*

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**WILMINGTON 98, DELAWARE**



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# Here's The Material You Requested!



We sincerely hope it provides you with the specific information you need. You can help us by filling in the enclosed reply card. It will also bring you added technical assistance if you so desire. A Du Pont Technical Representative will welcome the opportunity to serve you.

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Dallas, Texas 75221 . . . . . 1628 Oak Lawn Ave.  
Hollywood, Calif. 90038 . . . . . 7051 Santa Monica Blvd.  
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Wilmington, Delaware 19898



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A-36964

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I have just received the booklet on CRONAFLEX® Engineering  
Reproduction Films. I would like further information as indicated  
below:

☐ Have a Technical Representative call me.  
My telephone number is \_\_\_\_\_.

☐ Name of nearest dealer for CRONAFLEX.

☐ I would like a demonstration.

☐ Darkroom available.

☐ Darkroom not available.

This information is needed:

☐ For a particular application

☐ For a possible application

☐ For a reference file

Mr. T. Nelson  
Sys. Consultant  
Box 1546  
Poughkeepsie, N. Y. 12603  
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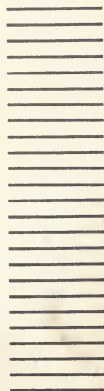
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**E. I. DU PONT DE NEMOURS & CO. (INC.)**

**Photo Products Department**

**Wilmington, Delaware 19898**



**Attn: F. H. Aikman**

# CRONAFLEX<sup>®</sup>

ENGINEERING REPRODUCTION AND  
DRAFTING FILMS

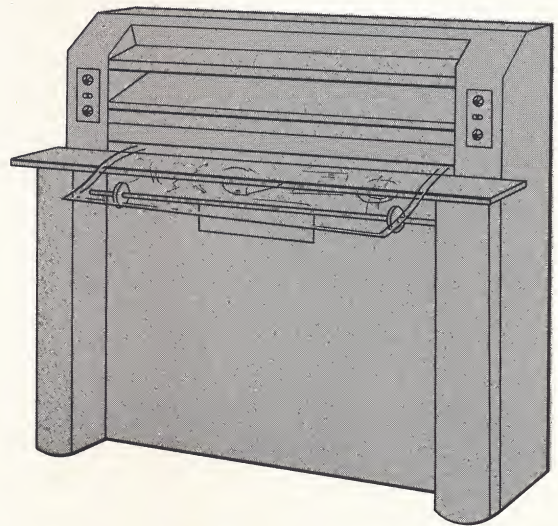
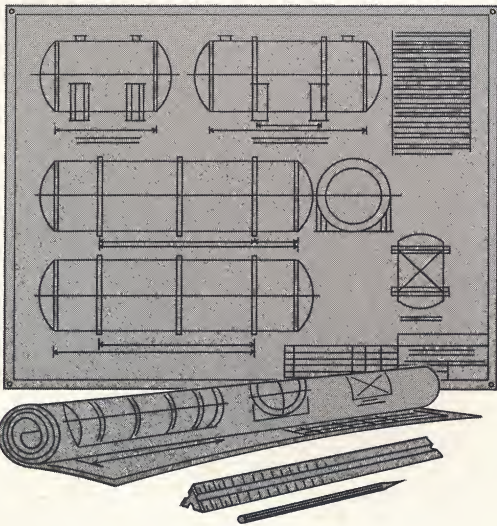
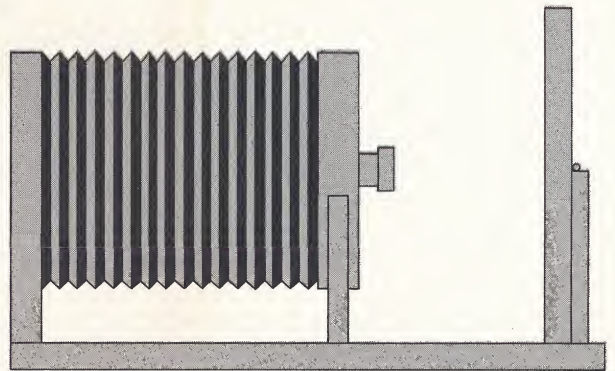
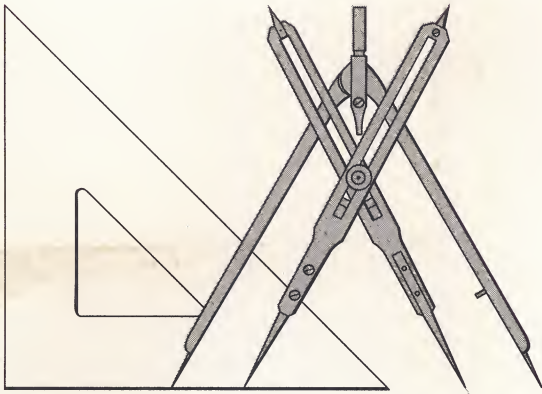


PHOTO PRODUCTS DEPARTMENT

# CRONAFLEX®

ENGINEERING REPRODUCTION FILMS

## CRONAFLEX Direct Positive Film .004 and .007 in.

**Gives you same size positive black-line reproductions directly from original pencil or ink drawings and can be handled in room light.**

CRONAFLEX Direct Positive Film is designed for exposure through yellow or amber sheeting\* with high-intensity illumination in contact printers and in direct process or blueprinting equipment. Both sides are matted to accept pencil or ink. This unique film gives a positive reproduction of the same size direct from the original drawing or other positive copy. This means one step instead of the usual two—negative and positive—normally required to obtain intermediates for direct process or blueprinting.

\*Du Pont DP-480 Amber sheeting is recommended.

## CRONAFLEX Contact Film .004 and .007 in.

**Provides the positive intermediate for direct process reproduction or blueprinting where negative-positive steps are used.**

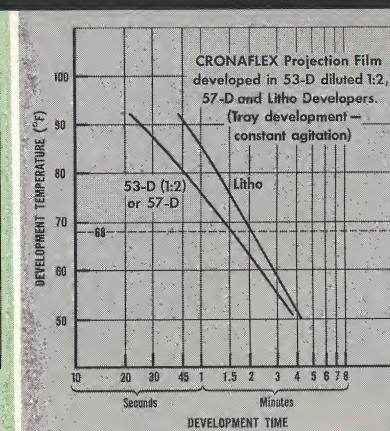
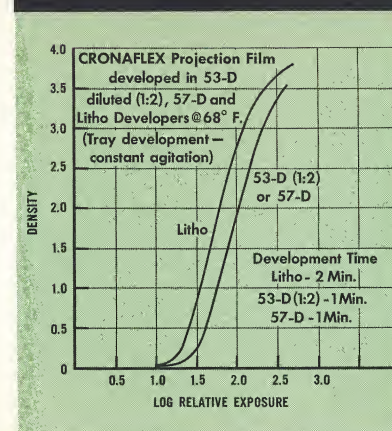
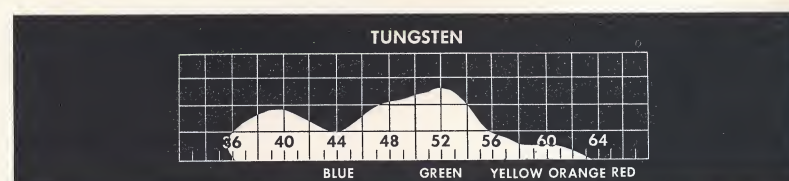
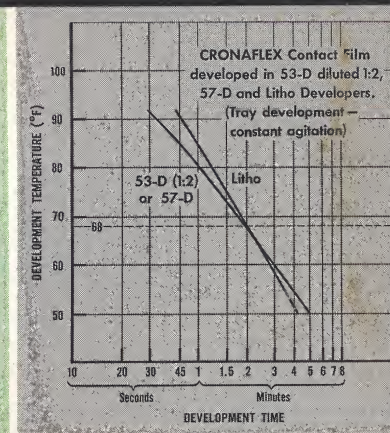
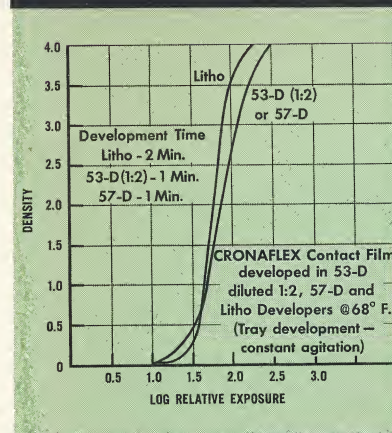
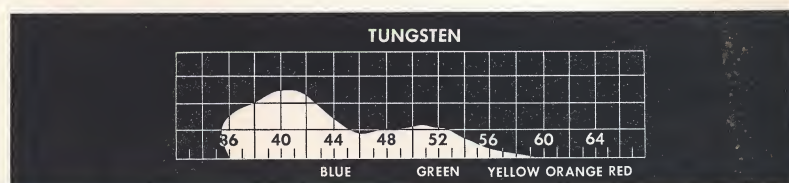
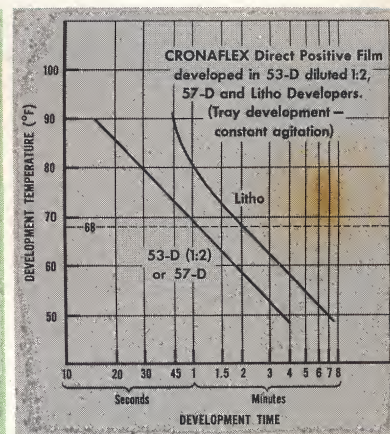
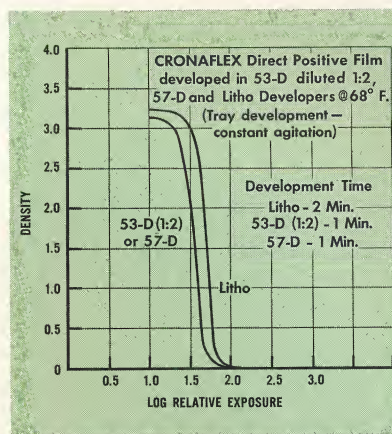
CRONAFLEX Contact Film will produce an extremely sharp same-size positive from a master negative, or vice versa. It is exposed in conventional vacuum frame, flat bed, continuous or contact printers. Both sides are matted to accept pencil or ink. The great advantage of CRONAFLEX Contact Film over conventional contact materials is its capacity to take severe abuse without breaking, cracking or discoloring. Where dimensional stability is important, it should be used for both the positive and negative steps.

## CRONAFLEX Projection Film .004 and .007 in.

**Offers high-contrast, projection speed emulsion for use in process cameras and enlargers.**

CRONAFLEX Projection Film is used for reproductions, enlargements and reductions of drawings, maps or halftones where durability and size holding are important. Both sides are matted to accept pencil or ink. It may also be used in contact printing with suitable adjustment of light intensity.

- Dimensional Stability
- Superb Drafting Surface
- Photographic Versatility
- Durability
- Kink Resistance
- Fast Print-Back Speed



# CRONAR<sup>®</sup> REDUCTION FILM

| SIZES                 | SPEC. NO.* |
|-----------------------|------------|
| 6 inches by 100 feet  | 952        |
| 6 inches by 200 feet  | 952        |
| 8 inches by 100 feet  | 1, 2       |
| 10 inches by 100 feet | 952        |
| 12 inches by 100 feet | 1, 2       |
| 12 inches by 350 feet | 28         |
| 15 inches by 100 feet | 1, 2       |
| 15 inches by 200 feet | 87         |
| 15 inches by 350 feet | 87         |
| 18 inches by 100 feet | 1, 87      |
| 18 inches by 200 feet | 87         |
| 19 inches by 150 feet | 87         |
| 19 inches by 350 feet | 87         |
| 20 inches by 200 feet | 87         |
| 21 inches by 100 feet | 87         |
| 22 inches by 200 feet | 87, 88     |
| 24 inches by 100 feet | 87         |
| 30 inches by 100 feet | 87         |
| 36 inches by 100 feet | 87         |
| 42 inches by 100 feet | 87         |

New CRONAR Reduction Film is a high-speed orthochromatic roll film designed to produce excellent quality negatives of engineering drawings. It is recommended specifically for use in the continuous flow reduction cameras such as the Revolute "R-M" Printer<sup>1</sup>, the Neo-Flow Camera<sup>2</sup> and the RECO Camera<sup>3</sup>.

## The advantages of CRONAR Reduction Film are:

- Tough, durable, CRONAR polyester base film defies all normal wear.
- It is kink resistant; will not dog-ear, crack or tear; shrugs off moisture; can be run through reproduction equipment literally thousands of times without damage. Further, CRONAR is extremely stable dimensionally and it can be stored indefinitely without yellowing or becoming brittle.
- Designed for processing in universal-type developers.
- High-contrast emulsion, combined with optical clarity of CRONAR base, gives sharp resolution of detail and crisp diazos.
- Provides wide exposure and development latitude to accommodate a variety of copy.
- Thin (.003 in.) polyester base permits maximum footage per roll, thus extending time between camera loadings.

\* See Winding Specifications Page 4

1 Charles Bruning Co., Inc.

2 Copymaton, Inc.

3 Reproduction Equipment Co.

# CRONAFLEX<sup>®</sup> DRAFTING FILMS

## CRONAFLEX Drafting Film .004 in.

**Superb matte surface is specially balanced to accept pencil over an extremely wide hardness range and to give originals the quality and sharpness needed for subsequent reproductions.**

CRONAFLEX Drafting Film is an exclusive combination of a superior matte surface—either one or both sides—and CRONAR polyester photographic film base. Du Pont makes the surface and the base in one complete process that assures consistent quality. Every piece of CRONAFLEX Drafting Film is subject to the most careful control during its entire manufacturing cycle. The result is a product combining unusual dimensional stability and tear strength with superior pencil acceptance and erasability. And because its transparency is superior to that of cloth, you get faster print-through speed with more uniformity.

## CRONAFLEX UC Drafting Film .004 and .007 in.

**The premium drafting and tracing film—designed for the optimum drafting quality.**

CRONAFLEX UC Drafting Film features a surface that is tailor-made for ink. Its fine matte tooth—on both sides—permits the highest degree of accuracy and clarity, while minimizing pen wear. And wet erasures can be made without leaving bothersome "ghosts." Like CRONAFLEX Drafting Film, CRONAFLEX UC offers outstanding dimensional stability. It also has the same high transparency, permitting faster print-back speeds with sharper reproduction than possible with cloth.

# CRONAFLEX® Engineering Reproduction and Drafting Films

## Standard Sheet and Roll Sizes

### SHEET FILMS

#### Engineering Reproduction Films and UC Drafting Films

| SIZE<br>(Inches) |   |    |
|------------------|---|----|
| 8½               | x | 11 |
| 9                | x | 12 |
| 10½              | x | 15 |
| 11               | x | 17 |
| 12               | x | 18 |
| 15               | x | 21 |
| 17               | x | 22 |
| 18               | x | 24 |
| 20               | x | 24 |
| 21               | x | 30 |
| 22               | x | 34 |
| 24               | x | 30 |
| 24               | x | 36 |
| 30               | x | 40 |
| 30               | x | 42 |
| 34               | x | 44 |
| 36               | x | 48 |

#### CRONAFLEX Drafting Films Matte one side or two sides

| SIZE<br>(Inches) | Sheets<br>Per Package |  |
|------------------|-----------------------|--|
| 8½ x 11          | 50                    |  |
| 9 x 12           | 50                    |  |
| 11 x 17          | 50                    |  |
| 12 x 18          | 50                    |  |
| 17 x 22          | 50                    |  |
| 18 x 24          | 50                    |  |
| 22 x 30          | 50                    |  |
| 22 x 34          | 50                    |  |
| 23 x 36          | 50                    |  |
| 24 x 36          | 50                    |  |
| 30 x 42          | 50                    |  |
| 34 x 44          | 50                    |  |
| 36 x 48          | 50                    |  |

### ROLL FILMS

#### Engineering Reproduction Films and UC Drafting Films

| SIZE<br>(Inches) (Feet) | Spec. No. |
|-------------------------|-----------|
| 11 x 100                | 900       |
| 12 x 100                | 900       |
| 15 x 100                | 900       |
| 18 x 50                 | 900       |
| 18 x 100                | 900       |
| 22 x 50                 | 900       |
| 22 x 100                | 900       |
| 24 x 50                 | 900       |
| 24 x 100                | 900       |
| 30 x 50                 | 900       |
| 30 x 100                | 900       |
| 36 x 50                 | 900       |
| 36 x 100                | 900       |
| 42 x 50                 | 900       |
| 42 x 100                | 900       |
| 44 x 50                 | 900       |
| 44 x 100                | 900       |
| 48 x 50                 | 900       |
| 48 x 100                | 900       |

#### CRONAFLEX Drafting Films Matte one side or two sides

| SIZE<br>(Inches) (Yards) | Spec. No. |
|--------------------------|-----------|
| 11 x 20                  | 902       |
| 11 x 50                  | 902       |
| 12 x 20                  | 902       |
| 12 x 50                  | 902       |
| 22 x 20                  | 902       |
| 22 x 50                  | 902       |
| 24 x 20                  | 902       |
| 24 x 50                  | 902       |
| 30 x 20                  | 902       |
| 30 x 50                  | 902       |
| 36 x 20                  | 902       |
| 36 x 50                  | 902       |
| 40 x 20                  | 902       |
| 40 x 50                  | 902       |
| 42 x 20                  | 902       |
| 42 x 50                  | 902       |
| 44 x 20                  | 902       |
| 44 x 50                  | 902       |

### PACKAGING

.004" Standard Thickness Packaged 50 sheets per box

.007" Heavy Thickness Packaged 25 sheets per box

Both .004" and .007" UC Drafting Films are packaged 50 sheets per box

### WINDING SPECIFICATIONS

| Spec.<br>No. | Emulsion<br>Wound | I.D. Paperboard<br>Core | Spec.<br>No. | Emulsion<br>Wound | I.D. Paperboard<br>Core | Other<br>Information      |
|--------------|-------------------|-------------------------|--------------|-------------------|-------------------------|---------------------------|
| 1            | in                | 1½"                     | 88           | out               | 3"                      |                           |
| 2            | out               | 1½"                     | 900          | in                | 3"                      |                           |
| 28           | out               | 2"                      | 902          | —                 | 2¾"                     |                           |
| 87           | in                | 3"                      | 952          | out               | 2¾"                     | End of film taped to core |

### SALES OFFICES

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GRegory 3-4004

Chirurg Building  
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#### CANADA

Du Pont of Canada Limited  
85 Eglinton Avenue, East  
Toronto 12, Ontario

#### EUROPE

Du Pont de Nemours International S.A.  
Etoile Building  
81, Route de L'Aire  
Geneva, Switzerland

#### EXPORT

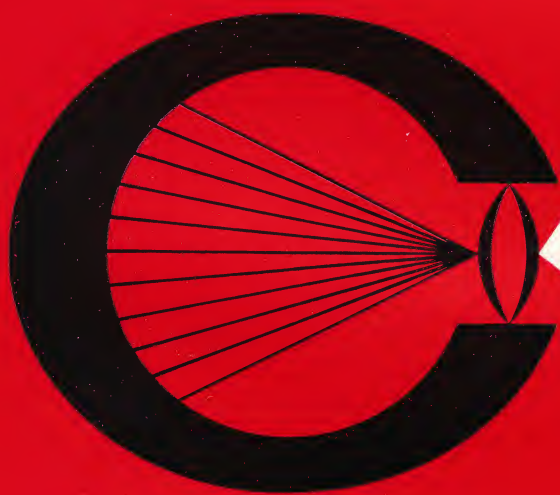
Export Sales  
11507 Nemours Building  
Wilmington, Delaware 19898



Better Things for Better Living  
...through Chemistry

E. I. DU PONT DE NEMOURS & CO. (INC.)  
PHOTO PRODUCTS DEPARTMENT  
WILMINGTON, DELAWARE 19898

# TECHNICAL DATA



**CRONAFLEX<sup>®</sup>**  
**Direct Positive Film**  
**.004 & .007 inches**



Better Things for Better Living . . . *through Chemistry*

# CRONAFLEX<sup>®</sup>

## Direct Positive Film

on "Cronar" polyester photographic film base

Order Code: DPM-4 .004" standard thickness

Order Code: DPM-7 .007" heavy thickness

... a high contrast, slow speed film which produces positive reproductions from positive originals with no intermediate or negative step required. Both the front and the back sides have matte drafting surfaces which will accept either pencil or ink.

### EXAMPLES OF USE:

- Restoration and replacement of deteriorated drawings.
- Intermediates for diazo and blueprint reproduction.
- "Second originals" which permit drafting modifications without altering the original drawing.
- Photodrawings.
- Reflex reproductions from opaque copy.

## PHOTOGRAPHIC PROCEDURES

### SAFELIGHT:

Illumination of ten foot candles is safe for a maximum of three minutes total working time.

*Normal roomlight* may be used during exposure provided low level illumination is maintained for processing.

Film may be protected to some extent during preparation by facing emulsion side away from light.

### EXPOSURE:

#### Equipment:

Expose through Du Pont DP-480 Amber Sheeting.

Diazo or Blueprint machines are suitable. Yellow quartz lamps will substitute for DP-480 sheeting. Vacuum frames are necessary for work requiring dimensional stability.

### Light sources:

#### Arc Lamps:

35 amps @ 6 ft.—3 min.

#### Incandescent lamps:

40" x 50" printer with 36-150 watt bulbs—1 min.

#### Others:

Gold fluorescent lamps and certain eye-ease incandescent lamps may be used in contact printers to eliminate the need for Amber Sheeting. Your Du Pont Technical Representative will supply specific information upon request.

### Lateral Reversal (Mirror Image):

Expose through back of "Cronaflex" Direct Positive Film. Use 25% more time than required for direct exposure to emulsion side.

### Negatives from Positives (or positives from negatives):

- (1) Place Amber Sheeting over film and expose for same time required to produce positive from positive.
- (2) Remove sheeting and expose again with copy (negative) in contact with film. Time is less than that for initial yellow light exposure. A typical second exposure with a single 35-amp arc at 6 ft. from copy is 20 seconds. A light source rich in blue is required. This technique is not suitable for reflex exposure.

### Reflex:

- (1) Position Amber Sheeting over film and place the emulsion side in contact with copy.
- (2) Expose through back of film. Since reflex exposures are more critical than print-through exposures, a test exposure is recommended. Reflex exposure requires approximately  $\frac{1}{3}$  the time of that for transmission exposure.

## PROCESSING:

### Developing:

*Higher contrast:* Develop in litho developer for 1½ to 2 minutes at 68°F.

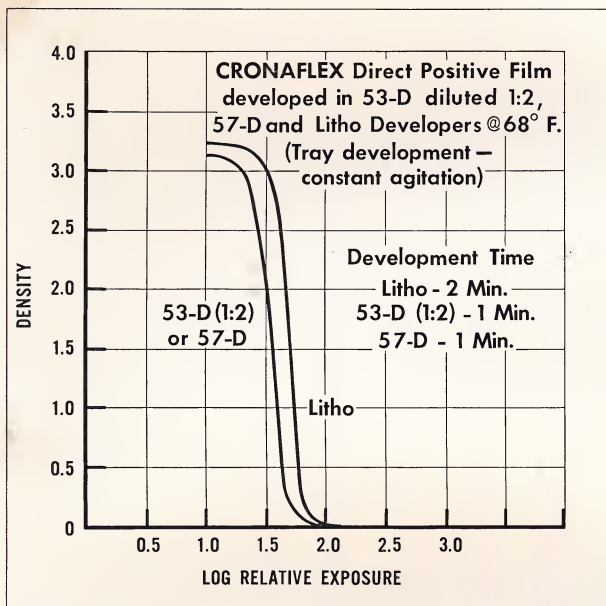
*Longer developer life:* Du Pont 53-D (diluted 1:2) for 30 sec.—1 min. at 68°F.

Du Pont 57-D for 30 sec.—1 min. at 68°F.

For longer developing time in 57-D dilute up to 1 part developer to 4 parts water.

### Characteristic Curves:

The following curves indicate the developing characteristics of "Cronaflex" Direct Positive Film in litho developer, 53-D and 57-D.



### Short Stop:

Rinse for 5 to 15 seconds in Du Pont 1-S Acid Stop Bath Solution to improve processing uniformity and to prolong the life of the fixer.

### Fixing:

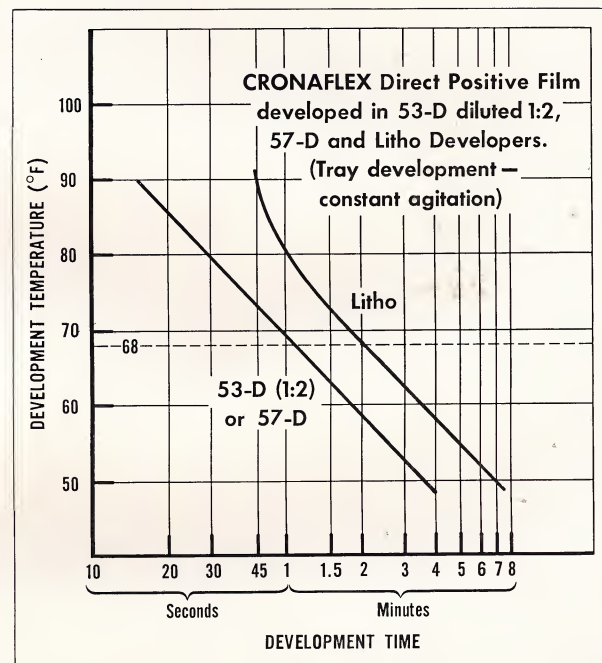
Fix 2 to 4 minutes in Du Pont 18-F Universal Fixer. 18-F is packaged ready to mix in sizes to make 1 quart, 2 quarts and 5 gallons of solution.

### Washing:

Wash thoroughly for approximately 10 minutes in rapidly changing water (or in six changes of water). Do not use wetting agents to aid drying if inks are to be applied.

## Time-Temperature Curve:

The following chart shows the effect of temperature variation on the developing times of "Cronaflex" Direct Positive Film.



### Drying:

Squeegee surface or wipe with a moist Du Pont Photographic Sponge and dry in a dust-free location. Film will dry to the touch in approximately 10 minutes. Hot belt or drum drying is not necessary. At least two hours are required for "Cronaflex" to come to equilibrium with room conditions—essential for maximum dimensional accuracy.

## FORMULA:

### DU PONT 1-S STANDARD ACID STOP BATH

|                     | Avoirdupois | Metric   |
|---------------------|-------------|----------|
| Water               | 1 gallon    | 4 liters |
| * Acetic Acid (28%) | 6 fl. oz.   | 192 cc.  |

\* Dilute 3 parts glacial acetic acid with 8 parts water. Always add acid to water—never water to acid.

## DRAFTING PROCEDURES

"Cronaflex" Films have matte surfaces front and back which are designed to give consistent performance throughout the product line. "Cronaflex" UC Drafting Film has the same characteristic surface as "Cronaflex" sensitized products. Conventional drafting techniques are

recommended. Specific recommendations for drafting materials may be obtained from your Du Pont Technical Representative. The following general recommendations will produce good results.

#### Pencils:

Graphite (F through 2H)—for general drafting.  
Plastic (Lower half of hardness scale)—for high degree of smudge resistance.

#### Removal of Pencil Lines:

Conventional soft rubber erasers.  
Plasticized vinyl erasers—for minimum effects to matte surface.  
Moist cotton swabs—for removal of large areas of pencil lines. Allow surface to dry prior to redrafting.

#### Ink Lines:

Standard drawing india or acetate inks may be used with conventional drawing instruments. Some inks designed for paper or cloth do not perform satisfactorily when used on "Cronaflex". Consult your Du Pont Technical Representative for assistance.

#### Removal of Ink Lines:

Moist cotton swabs—for removing large areas.  
Most satisfactory with waterproof inks.  
Allow surface to dry prior to redrafting.  
Abrasive erasers—It is possible to reduce or remove the matte through the use of abrasive erasers. Matte can be restored for ink drafting with Du Pont Matte Lacquer or soapstone.

#### Removal of Photographic Lines:

Eradicators—Several available brands are suitable for use on "Cronaflex".

Wash reproductions in water for removal of chemical residue.

As an alternate for washing, clean moist cotton swabs may be used.

Mechanical erasers and etching knives are sometimes used for deleting photographic lines by removing the matte surface containing the line. The matte is then restored with Du Pont Matte Lacquer or revisions are drafted on the reverse side.

Du Pont Matte Lacquer, available from your dealer, is a fast drying matte solution which can be used to replace the original matte when it has been removed by erasure or etching knife. It should be used only when new lines are to be drawn in ink.

#### Cleaning:

No preparation is required for drafting on "Cronaflex"; however, to insure against the effects of surface dirt and grease, certain cleaning agents are effective.

Dry cleaning pads—for large areas.

Art gum, soft rubber or vinyl erasers—for smaller areas.

Solvent cleaners should be used with care.

Open mouth bottles may become contaminated with oils and grease and destroy the effectiveness of these cleaners. A spray dispenser is recommended.

## DIMENSIONAL STABILITY

|                       |       |                                    |
|-----------------------|-------|------------------------------------|
| Humidity Coefficient: | DPM-4 | $1.4 \times 10^{-5}$ in./in./%R.H. |
|                       | DPM-7 | $1.2 \times 10^{-5}$ in./in./%R.H. |
| Thermal Coefficient:  | DPM-4 | $1.5 \times 10^{-5}$ in./in./°F.   |
|                       | DPM-7 | $1.5 \times 10^{-5}$ in./in./°F.   |

#### Sales Offices

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CANADA: Du Pont of Canada Limited, Toronto



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